

Figure 1

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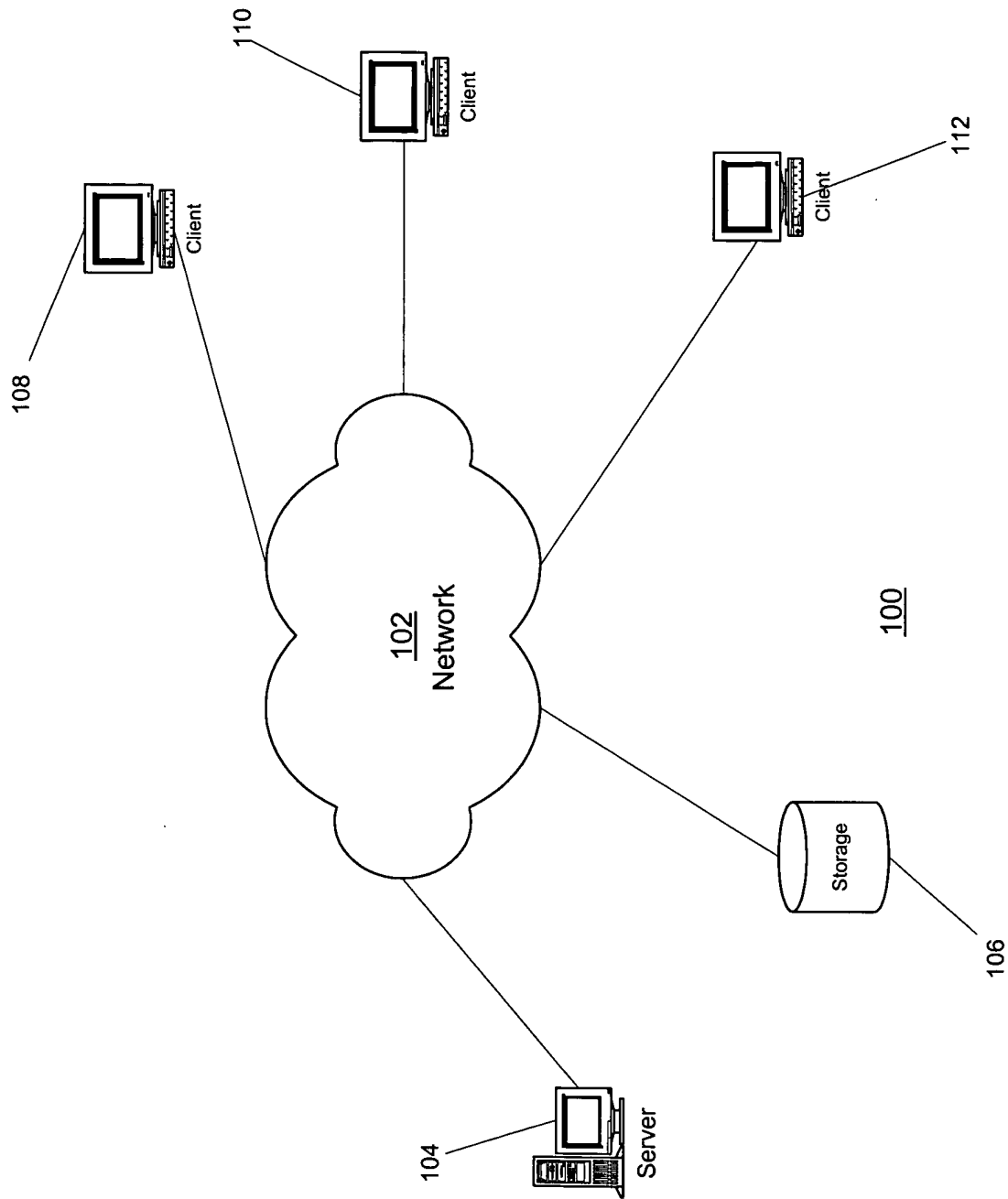


Figure 2

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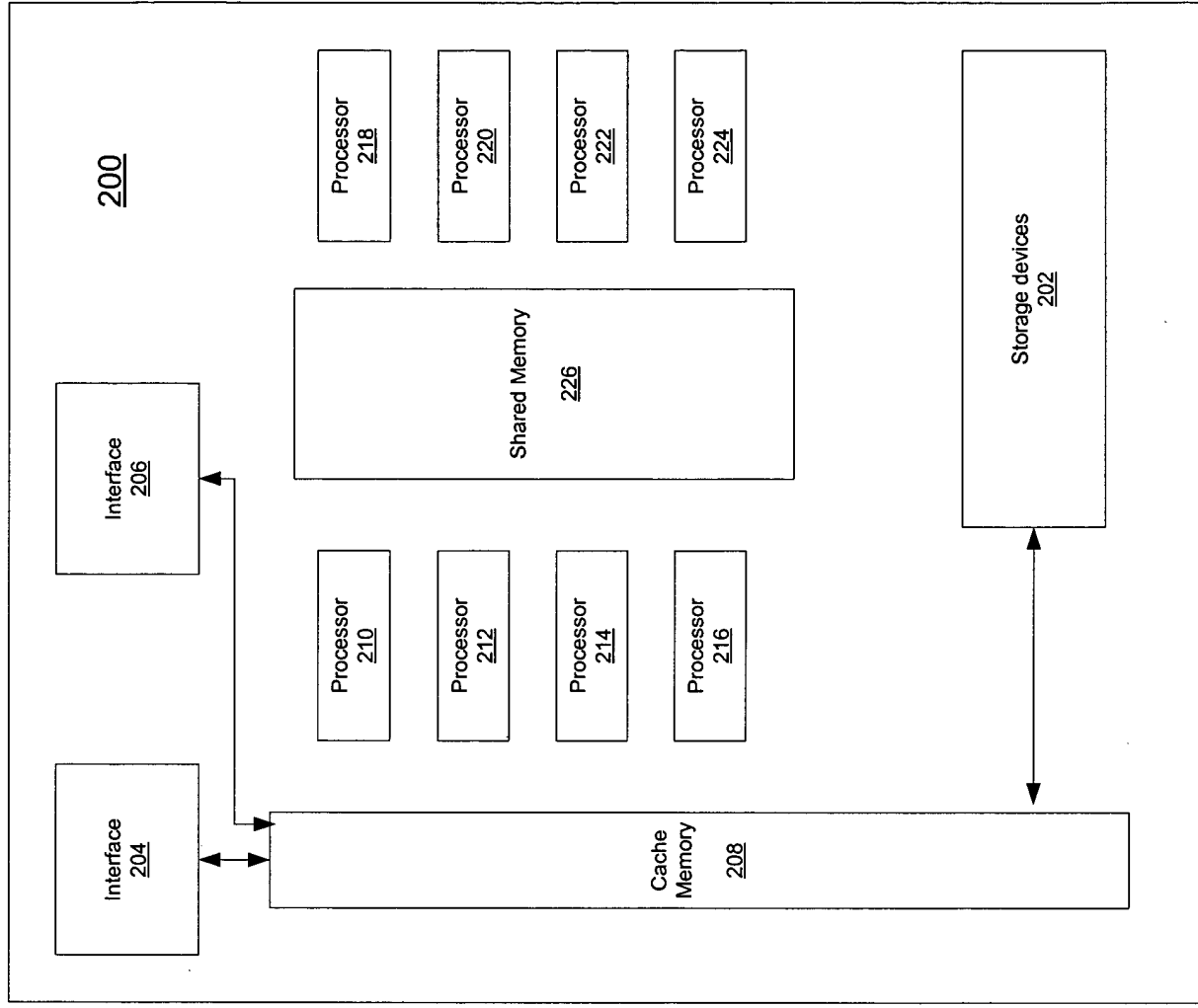
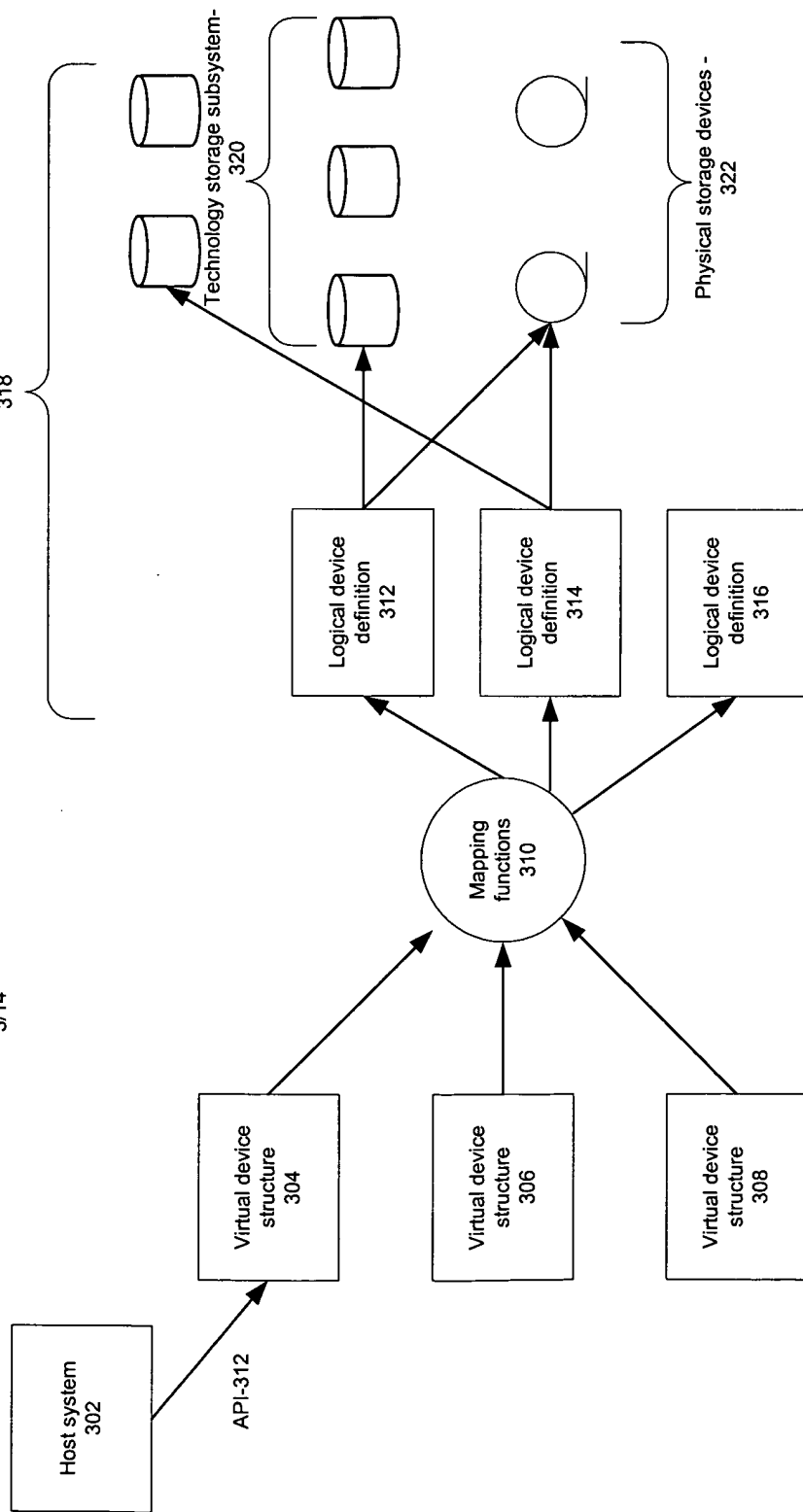


Figure 3

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RAID stripe group A

402

RAID stripe group A

Data - records n_j through n_k ; records n_{y+1} through n_z

404

RAID stripe group B

Data - records n_{k+1} through n_x ; records ...

406

RAID stripe group C

Data - records n_{x+1} through n_y ; records

Figure 4

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Figure 5

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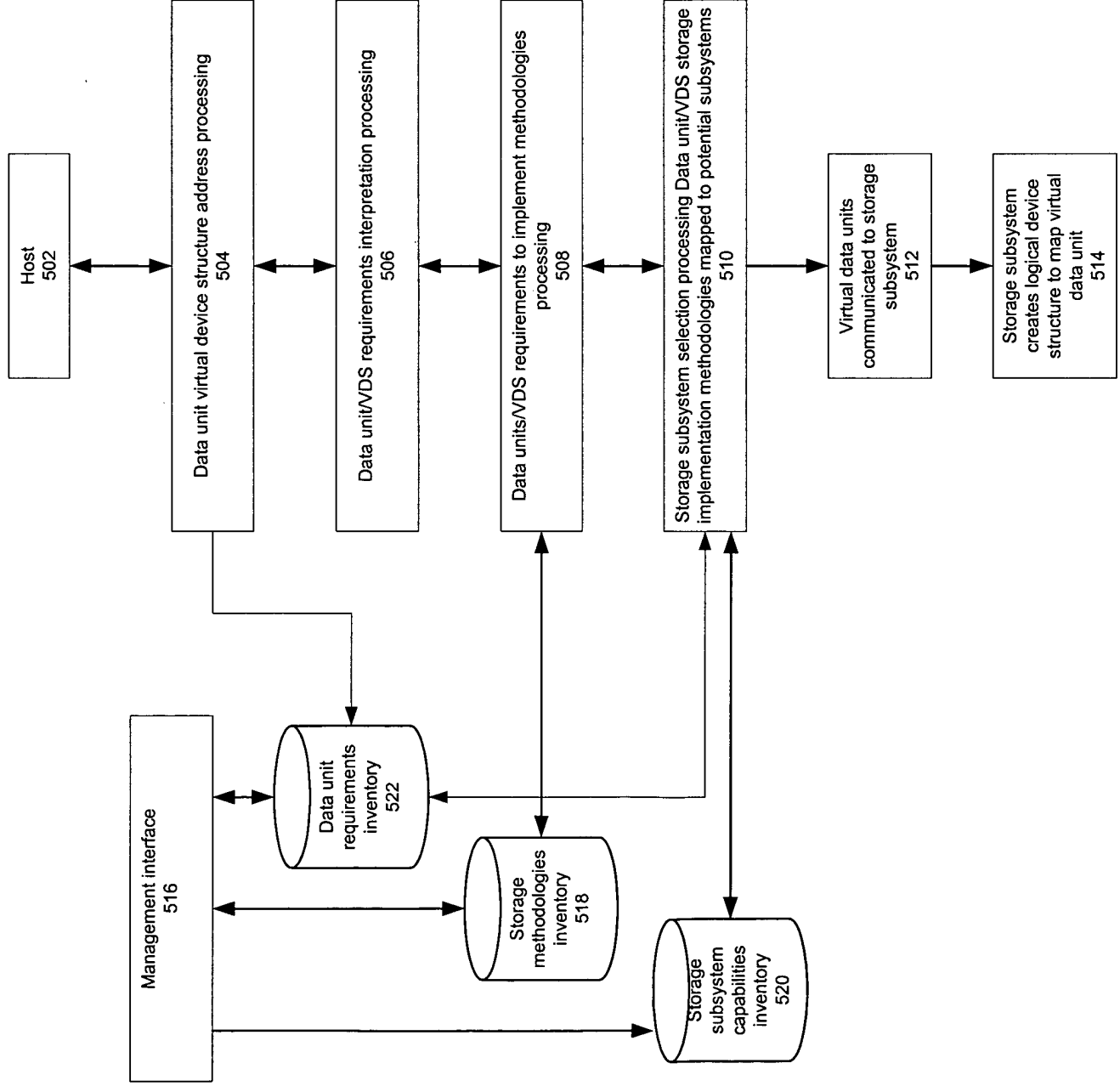


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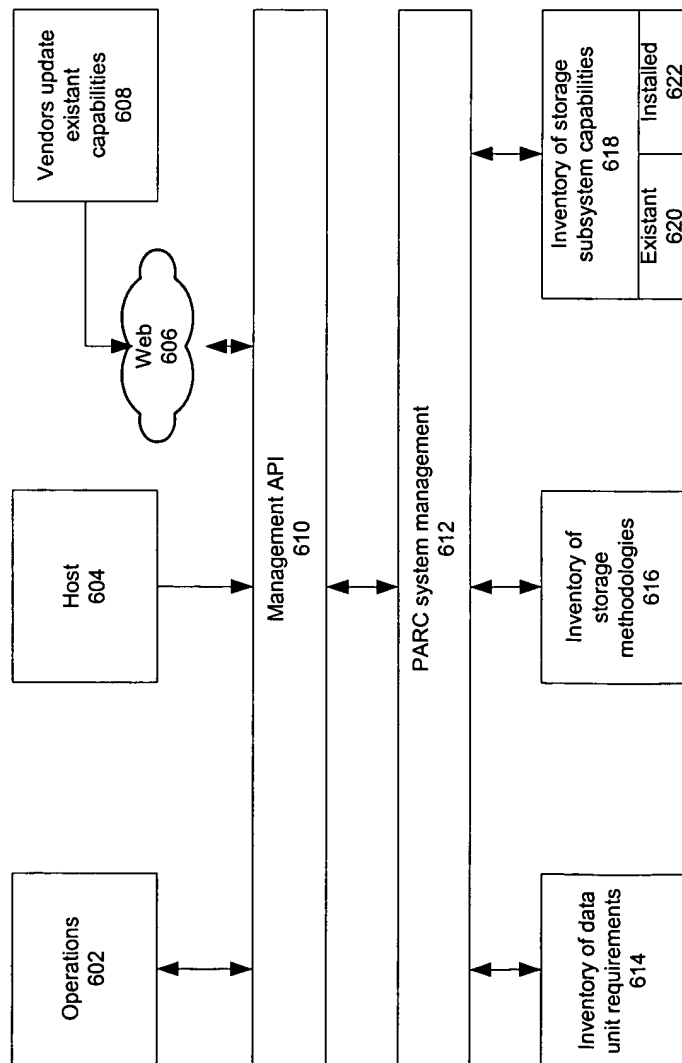


FIG. 7 is a block diagram of a system architecture for a data storage system. The system includes a VTT (Virtual Tape Transport) layer, a TNT (Tape Network Transport) layer, and a Back-end storage layer. The VTT layer consists of VTT Page 0 and VTT Page 1. VTT Page 0 contains eight Track Number entries, and VTT Page 1 contains eight Track Number entries. The TNT layer consists of TNT Page 0, TNT Page 1, and TNT Page 2. TNT Page 0 contains five Log Addr entries, TNT Page 1 contains five Log Addr entries, and TNT Page 2 contains five Log Addr entries. The Back-end storage layer consists of a single large block. Arrows indicate the flow of data from the VTT layer to the TNT layer and from the TNT layer to the Back-end storage layer. Specifically, each Track Number in VTT Page 0 is mapped to a Log Addr in TNT Page 0. Each Track Number in VTT Page 1 is mapped to a Log Addr in TNT Page 1. Each Log Addr in TNT Page 0 is mapped to a corresponding entry in the Back-end storage layer. Each Log Addr in TNT Page 1 is mapped to a corresponding entry in the Back-end storage layer. Each Log Addr in TNT Page 2 is mapped to a corresponding entry in the Back-end storage layer.

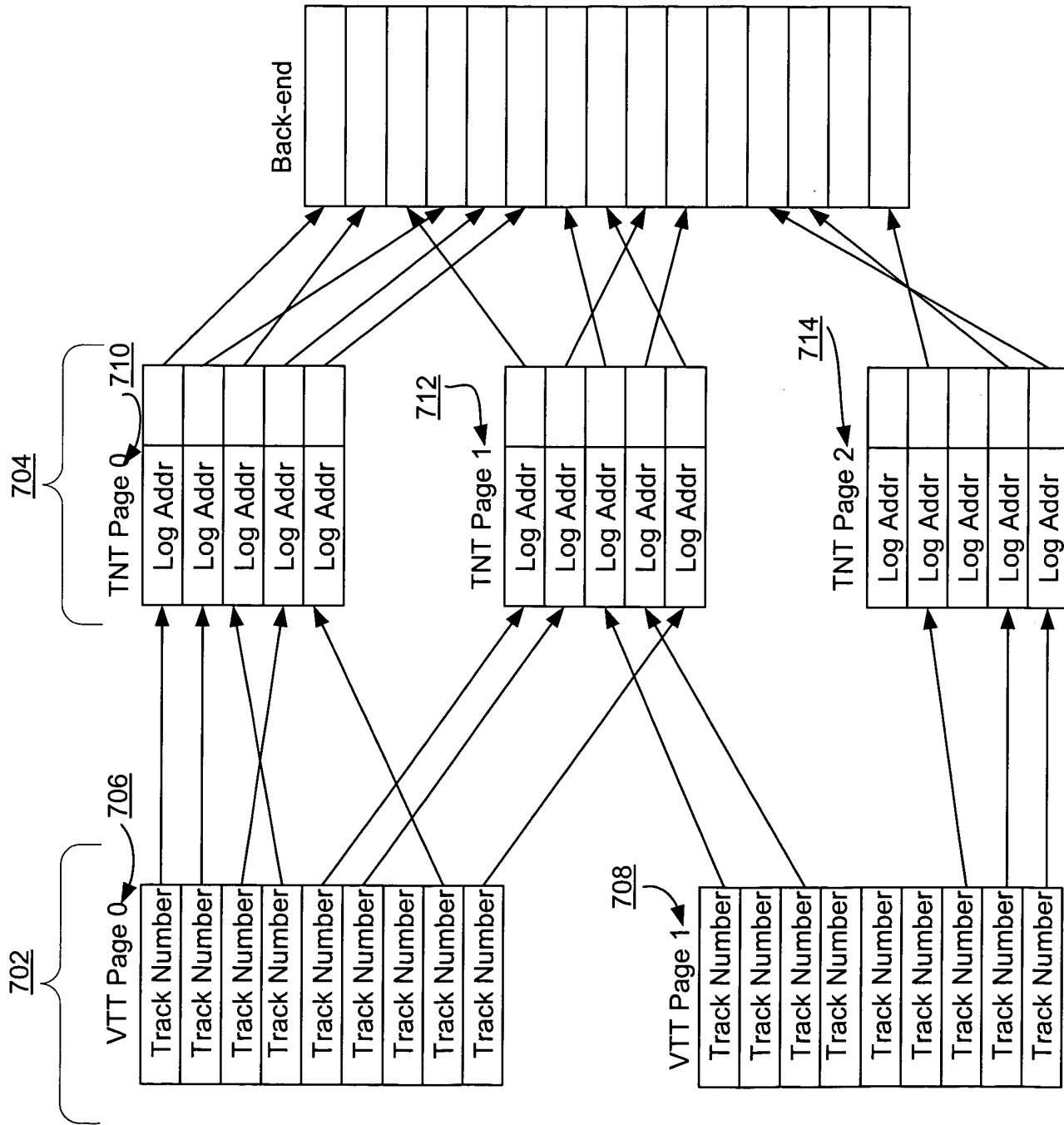


Figure 7

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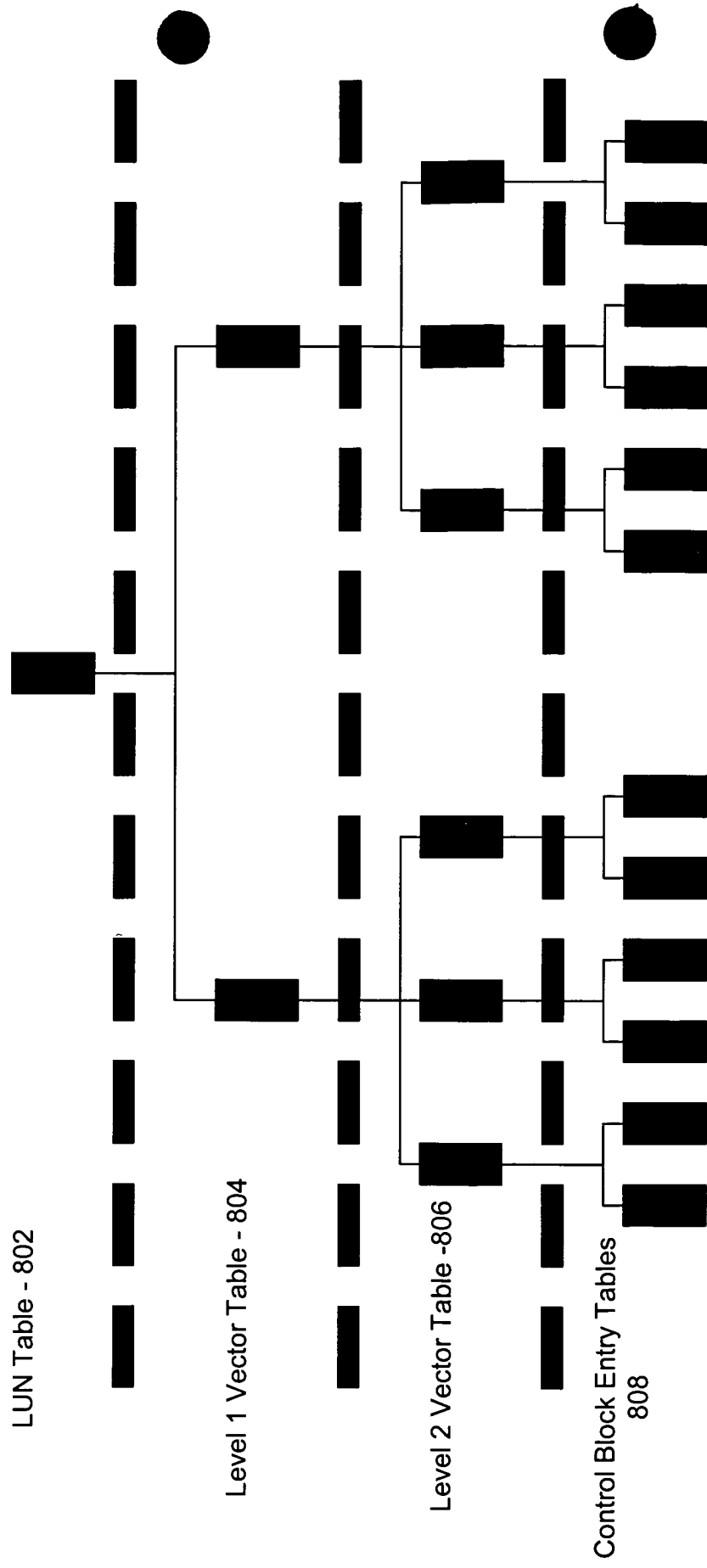


Figure 8

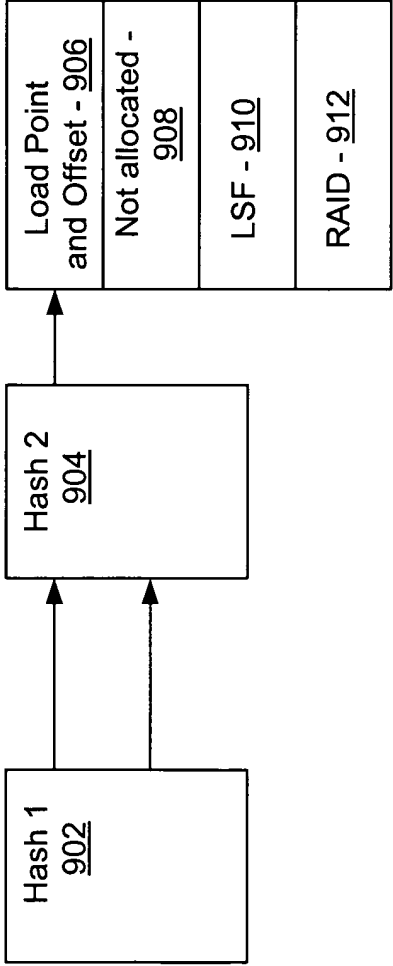


Figure 9

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Figure 11

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Stripe 1 - 1111
Stripe 4 - 1112
1113
1114
...

Drive - 1110

Stripe 1 - 1121
Stripe 2 - 1122
Stripe 3 - 1123
Stripe 4 - 1124
...

Drive - 1120

Stripe 1 - 1131
Stripe 2 - 1132
Stripe 3 Parity - 1133
Stripe 4 - 1134
...

Drive - 1130

Stripe 1 - 1141
Stripe 2 - 1142
Stripe 3 - 1143
Stripe 4 Parity - 1144
...

Drive - 1140

Stripe 1 Parity - 1151
Stripe 2 - 1152
Stripe 3 - 1153
Stripe 5 - 1154
...

Drive - 1150

Stripe 2 Parity - 1161
Stripe 3 - 1162
Stripe 4 - 1163
Stripe 5M - 1164
...

Drive - 1160

Figure 12

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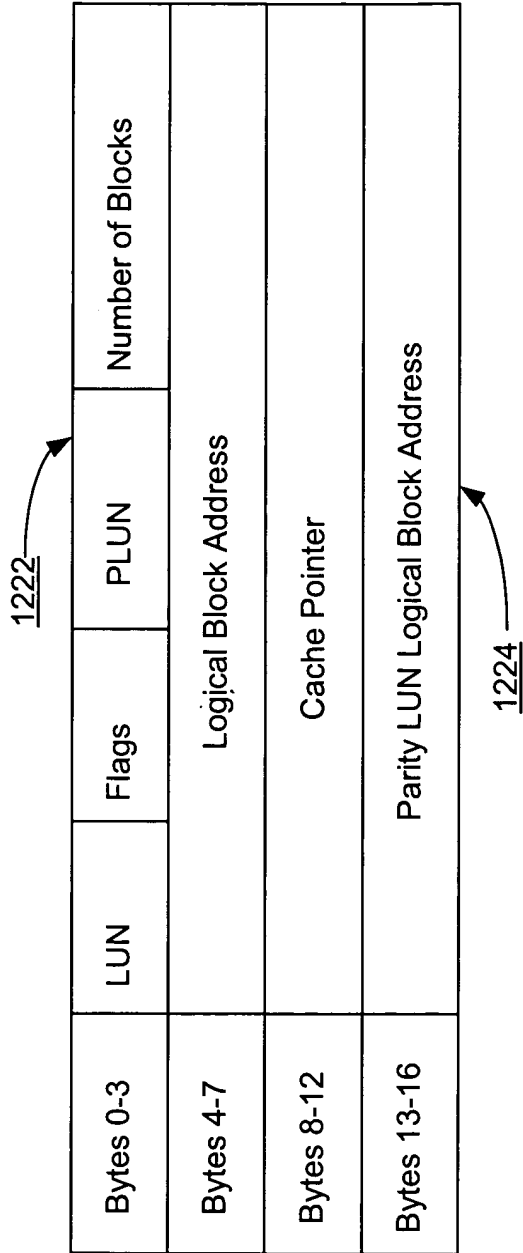
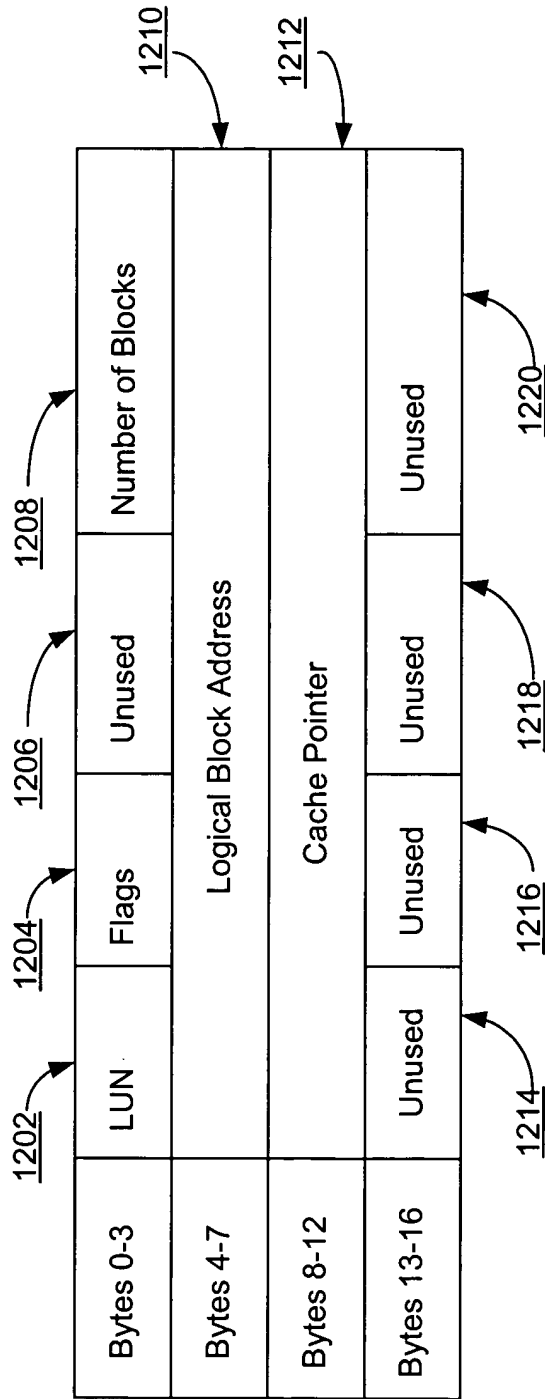


Figure 13

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Timestamp			
LBA of previous stripe			
Previous stripe LUN	Index of parity drive	RAID type of stripe	# of strips in stripe
Strip size in blocks			
1st LUN in stripe	Active count	# of host pieces in strip	Unused
LBA of data on 1st LUN			
2nd LUN in stripe	Active count	# of host pieces in strip	Unused
LBA of data on 2nd LUN			
Nth LUN in stripe	Active count	# of host pieces in strip	Unused
LBA of data on Nth LUN			
Host LUN	Length in strip	Host Length	
Host LBA			
Host LUN	Length in strip	Host Length	
Host LBA			

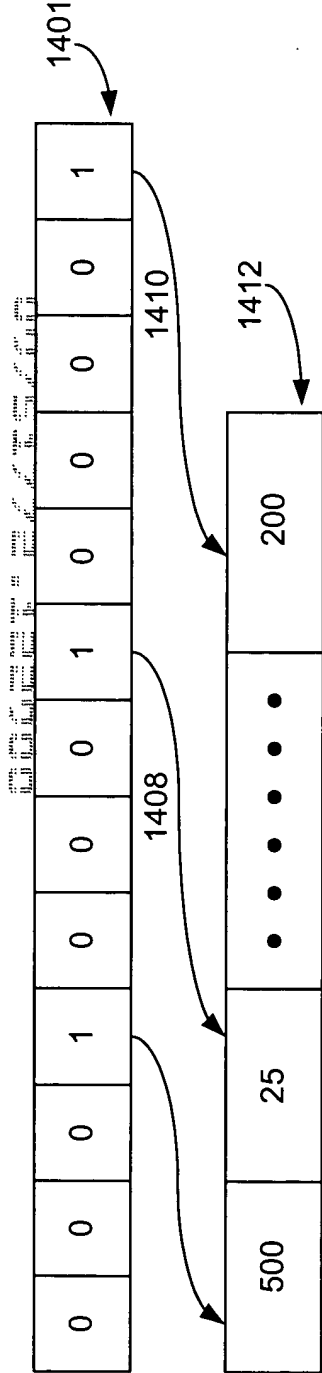


Figure 14
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Implied Storage Allocation
- 1402

Actual Storage Allocation
Map - 1404

